The remarkable fact displayed in his portion of the above table, that locusts only make their appearance in great numbers in the interval from minimum to maximum sun-spot and never during the interval from maximum to minimum sun-spot, is evidently regarded by Dr. Hahn as affording some additional collateral proof in favour of the relation he had already partially established between the rainfalls of Central Europe and the sun-spots, viz., that the interval from minimum to maximum sun-spot is in general drier and warmer than that from maximum to minimum sun-spot. The added dates apparently exhibit a relation to the sun-spot epochs similar to those given by Dr. Hahn.

Whether the laws which regulate the visitations of locusts are the same in other parts of the world or not, it is at all events suggestive to notice that the dates of their general appearance throughout the world, given by Mr. Walford in a recent paper to the Statistical Society, entitled, "Famines of the World, Past and Present," exhibit the same relation to the sun-spots as that noted by Dr. Hahn in the case of their visits to Europe.

The date of apparition, the locality visited, and the epoch of sun-spot minimum corresponding, are given below.

Date of Apparition.	Locality visited.	Epoch of Minimum Sun-Spot.
1802	India	1798·3
1812-13	,,	1810·6
1833-35	,,	1833·9
1855	United States	1856·0
1868	,,	1867 2
1874-77	,,	1877(?)
1878	China, Spain, Algeria, Bosnia, India	1877(?)

In the face of such an apparent predilection on the part of locusts to swarm during the minimum epoch of sun-spots, it might, I think, be advantageous to institute an extensive comparison of all past visitations of these insects with the eleven-year cycle of sun-spots. This after due allowance had been made for any known natural cycles of incubation, might possibly bring to light a physical cycle of visitation, the size and position of the area affected by which would, perhaps, afford some indication of the corresponding limits of the rainfall variation.

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The Range of the Mammoth

The criticism by Mr. Clement Reid of my paper recently read before the Geological Society, and not yet published, renders it necessary to remind him that his views as to the mammoth not being pre-glacial are not new, but were advanced by me ten years ago (*Pop. Science Review*, 1868, p. 275; *Geol. Mag.*, v. 7, July, 1868), and afterwards given up by the light of a wider experience. His arrangement of the complicated glacial deposits of Britain in one linear series, like all similar attempts, appears to me to be based on the fallacy that a difference in the character of the strata, in different areas, implies a difference in point of time. His divisions seem to me purely local, and mostly peculiar to the eastern counties. I see no reason for believing that, while five out of the six proposed were being accumulated east of the Pennine chain, there were no glacial phenomena in the west, in Lancashire or Cheshire, until the last phase, or the sixth of the eastern divisions; or, in other words, that the lower boulder clay of Lancashire and Cheshire is the equivalent of the last division. On the contrary, the marine sands and gravels covering the lower boulder clays, on both sides of the Pennine chain, and occupying a large area round Crewe, Stafford, and in the Trent Valley, is to me a well-marked horizon, defining the upper from the lower series of boulder clays. It is very likely that the lower boulder clay of Lancashire and Cheshire is the equivalent of the lower boulder clay series of Norfolk and Suffolk, as well as of the "moraine profonde" of Scotland. It must, however, be admitted that the correlation of the glacial deposits in various parts of Britain has not yet been satisfactorily made out. "Tot homines quot sententiæ."

To group them, as they are frequently now grouped, in one linear series, seems to me almost as useless as to construct a history of Europe in which the dynasties ruling various kingdoms at the same time are described one after another, and taken to belong to different periods because they were different dynasties.

W. Boyd Dawkins

Fossil Floras of the Arctic Regions

The author of the valuable paper communicated in Nature, vol xix. p. 124, on "The Fossil Floras of the Arctic Regions," will find in an essay of mine, entitled "Thalassa," and published in the course of last year, a number of facts and arguments in corroboration of his views regarding the influence of oceanic currents upon climate. In this essay, which is mainly founded upon the observations made on board H.M.S. *Challenger*, I have endeavoured to show how a relatively trifling elevation or depression of the sea-coast or of the bed of the ocean may considerably alter the configuration of an oceanic basin; how such an alteration must affect the direction, volume and temperature of existing currents, and thus have a tendency to change the climate and ultimately the distribution of animal and plant life in the regions bordering on the oceanic basin. I also (p. 29-30) ventured to express the opinion that "it appears hardly necessary to go in search of vast cosmic changes, such as an alteration in the position of the terrestrial axis, a diminution in the amount of solar heat . . . . while we have, close at hand, an agency whose effect upon climatic conditions may be said to be a matter of daily experience, and which is sufficiently powerful to establish, in almost any region on the earth's surface, the small difference of temperature which is a decree of life or of death to numerous animal and vegetable organisms." To this I may now add, that the influence of oceanic currents upon climate and upon the distribution of life will be most felt and produce the most remarkable results in the *Arctic* and *sub-Arctic* regions, which, as we know, may at one period be swept by powerful polar currents, at another invaded by vast masses of warm water brought there by currents from the tropical regions, such, for example, as the Gulf Stream.

The facts brought to light by recent sounding-operations regarding the configuration of the sea-bottom and the distribution of oceanic depths has led me to the conclusion that our continents and oceanic basins, such as they appear at the present day, are of immense antiquity; that changes in the distribution of land and water require for their accomplishment long periods, which, for all we know, may alternate with periods of repose or even of retrocession; and that, consequently, the influence of these changes upon currents and upon climate must be equally slow and uncertain in its duration. If, therefore, the effect of oceanic currents upon climate appears as an important factor, which can no longer be neglected in any discussion on the flora and fauna of past geological epochs, on the other hand, the slow and uncertain progress of the changes above mentioned seems to afford ample scope for the operation of other causes which, besides climate and temperature, determine the existence of certain species in a given area of the earth's surface.

J. J. Wild

The Microphone

Two subjects of interest in connection with the practical application of the microphone have lately been brought to my notice by Raja Sir T. Madava Row, K.C.S.I., Dewan of Baroda. In the hope of securing a little assistance from some of your scientific readers I hasten to lay them before you.

The first question is with reference to the use of a microphone as a stethoscope. It seems that native ladies of high position decline altogether to allow a doctor to examine the chest in the ordinary manner. Sooner than submit to such an examination they would prefer to die—certainly rather a staggering fact for those imbued with European ideas. In the cause of humanity it is therefore desirable to do something for those whose position and caste would be imperilled by *direct* examination. If the microphone could be so delicately arranged as to transmit the auscultatory sounds, a medical ear, even at a distance, would surely be able to detect the existence of any disease of the heart or lungs. In the few experiments that we have made with our limited appliances we have been able to hear the ticking of a watch at a distance of about 200 yards, and the roar of a black ant when attacked by his companion, but as yet we have heard no internal sounds from the human breast. Perhaps with better devised instruments some one may have been able to obtain that which has yet been denied to us. I am sure many native ladies would be glad to get an affirmative answer to the question, "Can the microphone be used as a stethoscope?"

The second subject seems to me to be a much more difficult one to grapple with. Sir Madava Row writes to me as follows:—

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"In the undulating region of Travancore, where the water-bearing strata heave and fall according to the locality concerned, I have come across a set of professional men who are generally consulted by those who wish to sink wells in view to ascertain whether, at a given spot, a well may be sunk with the probability of finding water *near enough*. These professional men undertake to predict where the springs will be found near, and where they will be found at great depth, and their predictions are generally verified with great accuracy. I took some trouble to ascertain how these men are enabled to predict the proximity, or otherwise, of the springs underground. Brushing aside the ceremonies and incantations they perform in view to deceive others and perhaps themselves also, I found that they detect the proximity of the subterranean springs by lying down on the bare ground in the dead silence of night, with the ear in contact with the ground, and trying to *hear the sound* of the flow of water in the strata beneath. By practice the ear is made very sensitive, and the degree of distinctness with which they hear the sound of flowing water enables them approximately to predict the depth of the springs. It is in this manner that appropriate spots are selected for sinking wells.

"Now, would any of the instruments you are experimenting with magnify the sound of the subterranean flow of water so as to greatly facilitate the process I have described? If so, it may be a considerable practical gain."

To this query I have hitherto been able to return no other answer than a negative one. Both the subjects are practical ones, and I only hope that there will be before long some light cast upon them. THOS. S. TAIT

Baroda, India, November 4

Leaf-Sheaths and the Growth of Plants

THE latest results of M. Bert's researches into the growth of plants (see *Comptes Rendus*, vol. 87, p. 695, November 4), have led me to publish an observation which I made on the inner sheaths of young leaves this last spring. The spring before last I was struck with the crimson-like colour of these silky sheaths on many trees, whereas the young leaves they cover are of a tender green, and it naturally occurred to me that their purpose was not only to form a wrapper to the leaf, but also a coloured screen, which would allow the red rays of the spectrum to pass, and to a certain extent quench the blue rays. But I could not understand why the latter rays should be cut off, since they are highly actinic, and the leaves themselves are green. Last spring I carefully noted the tints of the leaf-sheaths of different trees, with the following results:—

Name of Tree.	Tint of Inner Leaf Sheath.	Tint of Outer Leaf Sheath.
Elm	Red (crimson)	Reddish-brown.
Lime	Red (crimson)	Reddish-brown.
Beech	Red (crimson)	Brown.
Sycamore	Red (crimson).	
Ash		Sooty-black.
Horse-chestnut	Red (crimson).	
Maple	Bright-red.	
Birch	Brown.	
Oak	Brownish-red.	
The Bramble	Reddish.	
The Hawthorn	Red.	
Certain Roses	Red.	
Wild Cherry	Red.	

Sometimes the bark on the stem of young sycamore shoots and the top leaflets were tinged with a deep reddish-brown. The overlapping tips of young leaves in buds were frequently reddish, and the majority of outer leaf-cases were a warm or reddish-brown. The shining buds of the horse-chestnut afforded a fine example of the phenomenon. The leaf-cases were of a strong red, like carmine, the exposed tip of each sheath leaflet being dyed a deeper red at the middle, shading off to the edges, where they overlapped. Under this protective curtain was a layer of flossy fibre, like cotton, swathing the pale young leaves underneath.

The recent researches of M. Bert throw light on this interesting subject. He finds that plants kept under green glass shades soon perish, because these intercept the red or less refrangible rays of the spectrum, and allow the blue or more refrangible rays to pass. Red glass, on the contrary, sustains life, although it becomes enfeebled by reason of the withdrawal of all the blue rays. M. Bert thinks that all the rays are necessary to the full vigour of the plant, and in the proportion of the solar spectrum; but it would appear from the care which nature has taken to redden the young leaf-cases, that for certain trees at least, the spring sunlight is richer in blue rays than she wishes, and therefore she has arranged that part of them shall be excluded, while all the red rays (or those which affect the maximum reduction of carbonic acid gas, and the building up of tissues) are allowed to pass into the leaf. I should add that this effect of colour is evidently superadded to the other functions of the sheath, as it usually appears as a more or less perfect colouring of the *outer surface* of the sheath only. JOHN MUNRO

West Croydon

Hornets

THE following fact, which I have been enabled to verify concerning a hornet, may be interesting to some of the readers of NATURE:—In a letter I received from my grandson, a very observing and accurate young naturalist, there was the following statement, dated October 13, 1878, Tunbridge Wells:—

"Last week I caught a splendid large hornet on the hall window, and last Saturday I caught a smaller one on a small oak-tree in Hurst Wood (Tunbridge Wells). He was engaged in eating some sticky, whitish stuff which had come out of the tree in several places where it had been cut or bruised. This stuff seemed to attract all the insects in the neighbourhood, especially swarms of flies. There were two red admirals (butterflies), two hornets, four wasps, and hundreds of bluebottles and other small flies, busily engaged in eating this substance, which was bored with small round holes. On Sunday, as we came home from Speldhurst Church, we passed the same tree, and on it, to my great surprise, I caught half a hornet, which was very active, running about the tree, and seemed to be quite happy and comfortable. He had no abdomen at all, except a small piece of the upper skin, which hung on; his left wings were very much battered, and he had lost his left hind leg." This half hornet was brought home and examined, keeping actively alive until the evening, when it was destroyed for the sake of preservation. I had an opportunity of examining the half hornet alluded to very soon after, and the facts detailed in the letter I have quoted were ascertained to be quite correct. This hornet was a small specimen, and I found all the abdomen gone except a small portion of the upper part of the first joint, which still remained attached to the thorax. The left wings were much broken, and one hind leg gone. In this disabled state, how long the hornet might have lived is a point which I regret was not ascertained.

Raystead, Worthing WM. WILSON SAUNDERS

Equine Sagacity

A PLEASANT story has just come to us from the Cape of Good Hope. In Graaf-Reinett, as in all the old Dutch towns in the colony, there is, in the centre of the place, a large market square, where the farmers, traders, and others, arriving with their produce at any hour of the day or night, may "out-span" the oxen or horses from their waggons, send the cattle out to the "commonage" to feed, while they bivouac at their waggons, as is the wont of African travellers to do, until the eight o'clock morning market auction.

An old horse belonging to one of these parties had wandered about in search of grass and water—vainly, no doubt, for it was during the severe drought from which the country is but now recovering. Coming to the great bare market-place, and finding a knot of men talking there, he singled out one of them, and pulled him by the sleeve with his teeth. The man, thinking the horse might possibly bite, repulsed him, but as it was not very roughly done, he returned to the charge, with the same reception; but he was a persevering animal, and practically demonstrated the axiom that "perseverance gains the day," for upon his taking the chosen sleeve for the third time between his teeth, the owner awoke to the idea that a deed of kindness might be required of him; so, putting his hand upon the horse's neck, he said, "All right, old fellow; march on!" The horse at once led the way to a pump at the further side of the square. Some coloured servants were lounging about the spot. One of them, at the bidding of the white man, filled a bucket with water; three times was the bucket replenished and emptied before the "great thirst" was assuaged, and then the grateful brute almost spoke his thanks to his white friend by rubbing his

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